STICH: Physician
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Presenter Disclosure Information

David R. Holmes, Jr., M.D.

“STICH: Physician”

The following relationships exist related to this presentation:

Immediate Past President ACC
What do Interventional Cardiologists Think?

- Interventional cardiologists actually do think (contrary to what surgeons may believe)
- Ischemic burden is important for treatment strategies
- Myocardial viability is important for outcome
- LV dysfunction and extensive complex MVD is best treated by CABG
CABG with or without Surgical Ventricular Reconstruction – STICH Trial

1,000 pt
EF ≤0.35
CAD
Dominant anterior LV dysfunction

CABG alone
CABG + surg ventricular reconstruction

Death from Any Cause or Hospitalization for Cardiac Causes

Death from Any Cause

P=0.90
P=0.98

Jones: NEJM, 2009
Baseline and 4 Month ESVI: STICH Trial

ESVI (mL/m²)

- CABG (n=212):
  - Baseline: 82
  - 4 months: 77

- CABG+SVR (n=161):
  - Baseline: 83
  - 4 months: 67

P<0.001

Jones: NEJM, 2009
STICH Trial: CABG With or Without Surgical Ventricular Reconstruction

- 2002-2006
- 1000 patients
- EF <0.35

Death from Any Cause or Hospitalization for Cardiac Causes

Death from Any Cause or Hospitalization for Cardiac Causes

NYHA Heart Failure Class

Jones: NEJM, 2009
STICH Trial
Observations

- Population: 1000 pts with EF \(\leq 35\%\), CAD amenable to CABG, dominant anterior LV dysfunction amenable to reconstruction
  - 64\% - 3VD, 14\% LMCA, EF 28\%
  - 50\% CCS III or IV angina
  - 48\% NYHA CHF Class III or IV
- “The findings of this study do not support the use of surgical ventricular reconstruction in this population”

## STICH Trial

### Issues

- **Negative trial:** “No significant difference in primary outcome which occurred in 59% of patients assigned to CABG alone and 58% assigned to CABG and surgical ventricular reconstruction (HR 0.99, 95% CI, 0.84-1.17, p=0.90)"

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STYNTAX Trial

- Negative Trial: “Since noninferiority was not proven in this cohort, specific information for each subgroup is of an observational nature and is (only) hypothesis generating”

STICH Trial

Why Didn’t Surgical Reconstruction Work?

• Maybe it just doesn’t (diastolic distensibility)

• Maybe the surgeons did not know how to do it

• Wrong patient group (inclusion criteria liberalized)

• Selective patient enrollment
Acrimony

- “We conclude the editorial by… is misleading”
- “To suggest otherwise is inaccurate”
- “The STICH trial unraveled”
- ‘The STICH trial: misguided conclusions”
- “Statisticians can defy nature from a flawed database”
- “Costly, flawed, inaccurate”
SVR Outcomes

CHF Survival: Registry Data

## LVESV and SVR

<table>
<thead>
<tr>
<th>Author (yr)</th>
<th># Pts.</th>
<th>Preop</th>
<th>Postop</th>
<th>Reduction (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Di Donato (2009)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type 1</td>
<td>56</td>
<td>83</td>
<td>35</td>
<td>48 (58)</td>
</tr>
<tr>
<td>Type 2</td>
<td>55</td>
<td>87</td>
<td>39</td>
<td>48 (55)</td>
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<tr>
<td>Type 3</td>
<td>67</td>
<td>96</td>
<td>57</td>
<td>39 (41)</td>
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<tr>
<td>Suma (2009)</td>
<td>76</td>
<td>123</td>
<td>74</td>
<td>49 (40)</td>
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<tr>
<td>Dor (2008)</td>
<td>104</td>
<td>93</td>
<td>51</td>
<td>42 (45)</td>
</tr>
<tr>
<td>Menicanti (2007)</td>
<td>301</td>
<td>173</td>
<td>100</td>
<td>73 (42)</td>
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<tr>
<td>O’Neill (2006)</td>
<td>135</td>
<td>120</td>
<td>77</td>
<td>43 (36)</td>
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<tr>
<td>Adams (2006)</td>
<td>8</td>
<td>92</td>
<td>59</td>
<td>33 (36)</td>
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<tr>
<td>Schreuder (2005)</td>
<td>9</td>
<td>92</td>
<td>45</td>
<td>47 (51)</td>
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<tr>
<td>Yamaguchi (2005)</td>
<td>20</td>
<td>137</td>
<td>65</td>
<td>72 (53)</td>
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<tr>
<td>Mickleborough (2004)</td>
<td>41</td>
<td>97</td>
<td>65</td>
<td>32 (33)</td>
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<tr>
<td>Athanasuleas (2004)</td>
<td>671</td>
<td>80</td>
<td>57</td>
<td>24 (30)</td>
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<tr>
<td>Jones (STICH 2009)</td>
<td>161</td>
<td>83</td>
<td>67</td>
<td>16 (19)</td>
</tr>
</tbody>
</table>

Extent of LVESV Reduction Following SVR

11 Published Series

-30
-33
-39
-43
-43
-39
-47
-52
-45
-41
-19


Menicanti LA & Wechsler A
**San Donato, Milan Hospital Experience**

Death from any cause following SVR

- Post-op ESVI ≥60 mL/m²
- Post-op ESVI <60 mL/m²
- 30%

**STICH Trial**

Death from any cause

- Post-op ESVI
- SVR (-16) = 66 mL/m²
- CABG (-5) = 78 mL/m²
- 32%

Menicanti: EJHF, 2010

Adapted from NEJM 360:1705-17, 2009
## Joint ESC-EACTS Guidelines on Revascularization

### Myocardial Revascularization in CHF

<table>
<thead>
<tr>
<th>In patients with CHF and presenting with angina</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CABG is recommended for:</strong></td>
</tr>
<tr>
<td>- Significant LM stenosis</td>
</tr>
<tr>
<td>- LM equivalent (proximal stenosis of both LAD &amp; LCx)</td>
</tr>
<tr>
<td>- Proximal LAD stenosis with 2- or 3-vessel disease</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CABG with SVR may be considered in patients with LVESV index ≥60 mL/m² and scarred LAD territory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class</td>
</tr>
<tr>
<td>IIb</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PCI may be considered if anatomy is suitable, in the presence of viable myocardium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class</td>
</tr>
<tr>
<td>IIb</td>
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</tbody>
</table>
Myocardial Viability and Survival
STICH Trial Substudy

• Substudy of a negative study
• Of 1,212 initially enrolled only 601 (49%) had assessment of myocardial viability and only 487 had viability (40%)
• Of 601 patients – random assignment to medical therapy + CABG or medical therapy alone

Probability of Death and Myocardial Viability

Hazard ratio, 0.64 (95% CI, 0.48-0.86)
P=0.003

No. at risk
Without viability 114
With viability 487

Years since randomization

Death and Viability

Without Myocardial Viability

- Medical therapy (33 deaths)
- CABG (25 deaths)

With Myocardial Viability

- Medical therapy (95 deaths)
- CABG (83 deaths)

Subgroup

- Without viability: 114, 58
- With viability: 487, 178

## Myocardial Viability and Survival

### STICH Trial Substudy

<table>
<thead>
<tr>
<th></th>
<th>Viable Myocardium (n=487)</th>
<th>No Viable Myocardium (n=114)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Death</td>
<td>37%</td>
<td>51%</td>
</tr>
</tbody>
</table>

- After adjustment for baseline variables, association with mortality NS p=0.21
- No significant difference between myocardial viability and medical versus surgical therapy

Myocardial Viability and Survival
STICH Trial Substudy – Issues

- Substudy of a negative study
- Substudy represents ~ 50% of randomized study
- Small number of patients without viability
- Investigator bias
- Variable assessment of viability
- Low rates of death on maximal medical therapy

Conclusions: The presence of viable myocardium was associated with a greater likelihood of survival in patients with coronary artery disease and left ventricular dysfunction, but this relationship was not significant after adjustment for other baseline variables. The assessment of myocardial viability did not identify patients with a differential survival benefit from CABG, as compared with medical therapy alone.
Myocardial Viability and Survival
STICH Trial Substudy

“The findings of this multivariable analysis do not necessarily indicate that myocardial viability does not have pathophysiological importance in patients with CAD and LV dysfunction.”

CABG in Patients with LV Dysfunction

STICH Substudy

- 1,212 patients with EF of ≤35% and CAD amenable to CABG
- Random assignment to medical therapy or medical therapy plus CABG
- Primary outcome death from any cause

Velazquez et al. N Engl J Med 2011;364;1607-16
All-Cause Mortality – As Treated

HR 0.70 (0.58 - 0.84)
P<0.001

Mortality rate

Years from randomization

0.0 0.2 0.4 0.6 0.8 1.0

0 1 2 3 4 5 6

NEJM 2011
All-Cause Mortality – As Treated

HR 0.70 (0.58 - 0.84)
P<0.001
STICH Trial – Outcomes

- 1,212 pt
- 2002-2007
- EF <0.35
- CCS angina ≤2 (95%)
- NYHA ≤3 (97%)

All Cause Mortality

Hazard ratio 0.86
95% CI 0.72-1.04
P=0.12

Medical therapy
CABG

CV Mortality and CHF Hospitalization

Hazard ratio 0.81
95% CI 0.66-1.00
P=0.05

Medical therapy
CABG

Hazard ratio 0.74
95% CI 0.64-0.85
P<0.001

Medical therapy
CABG

Velasquez: NEJM, 2011
Conclusions: In this randomized trial, there was no significant difference between medical therapy alone and medical therapy plus CABG with respect to primary end point of death from any cause. CABG patients, as compared with those assigned to medical therapy alone, had lower rates of death from cardiovascular causes and of death from any cause or hospitalization for cardiovascular causes.
All death is sudden – one moment you are alive and the next you are dead
“Whatever happened to elegant solutions?”
STICH Trial

• Surgical ventricular reconstruction + CABG is not better than CABG alone
• The presence or absence of myocardial viability does not affect adjusted mortality with either medical therapy or medical therapy + CABG
• In medically treated patients, death from any cause is similar between medically treated patients and those with medical therapy and CABG
• But viability may still be important – perhaps – but not sure
Clinical Scenario

• 70 year-old male with prior MI
  • EF – 32%, anterior severe hypo or akinesis
  • 3 vessel CAD amenable to CABG
  • CHF symptoms – mild to moderate angina

• What to do
  • Work up: ? Assess viability
  • Rx: Optimal medical therapy + ICD
  • CABG + SVR
  • Ischemia guided PCI
  • CABG alone